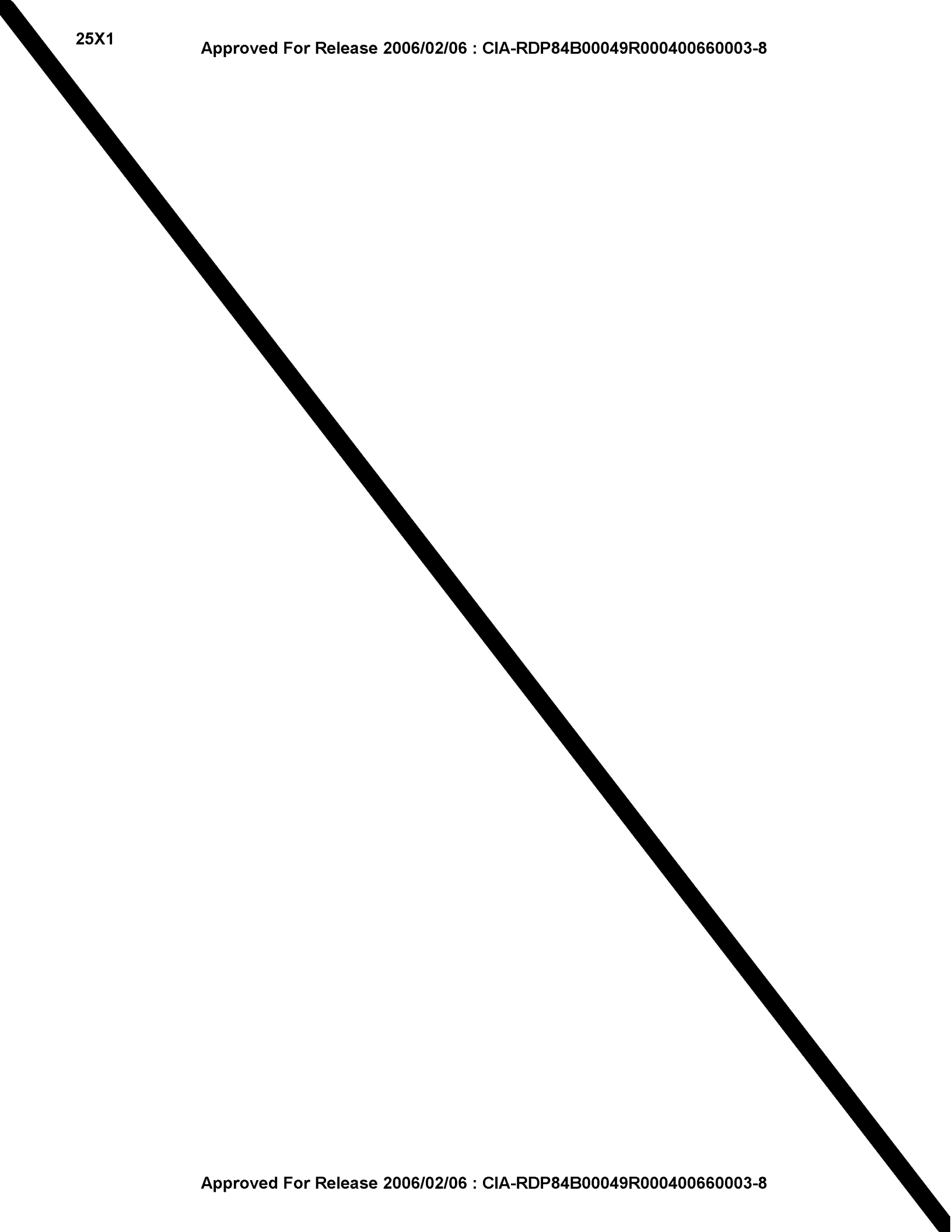

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Soviet Views on Energy Consumption in 1985 [redacted]

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A Research Paper

SOV 82-10161
October 1982

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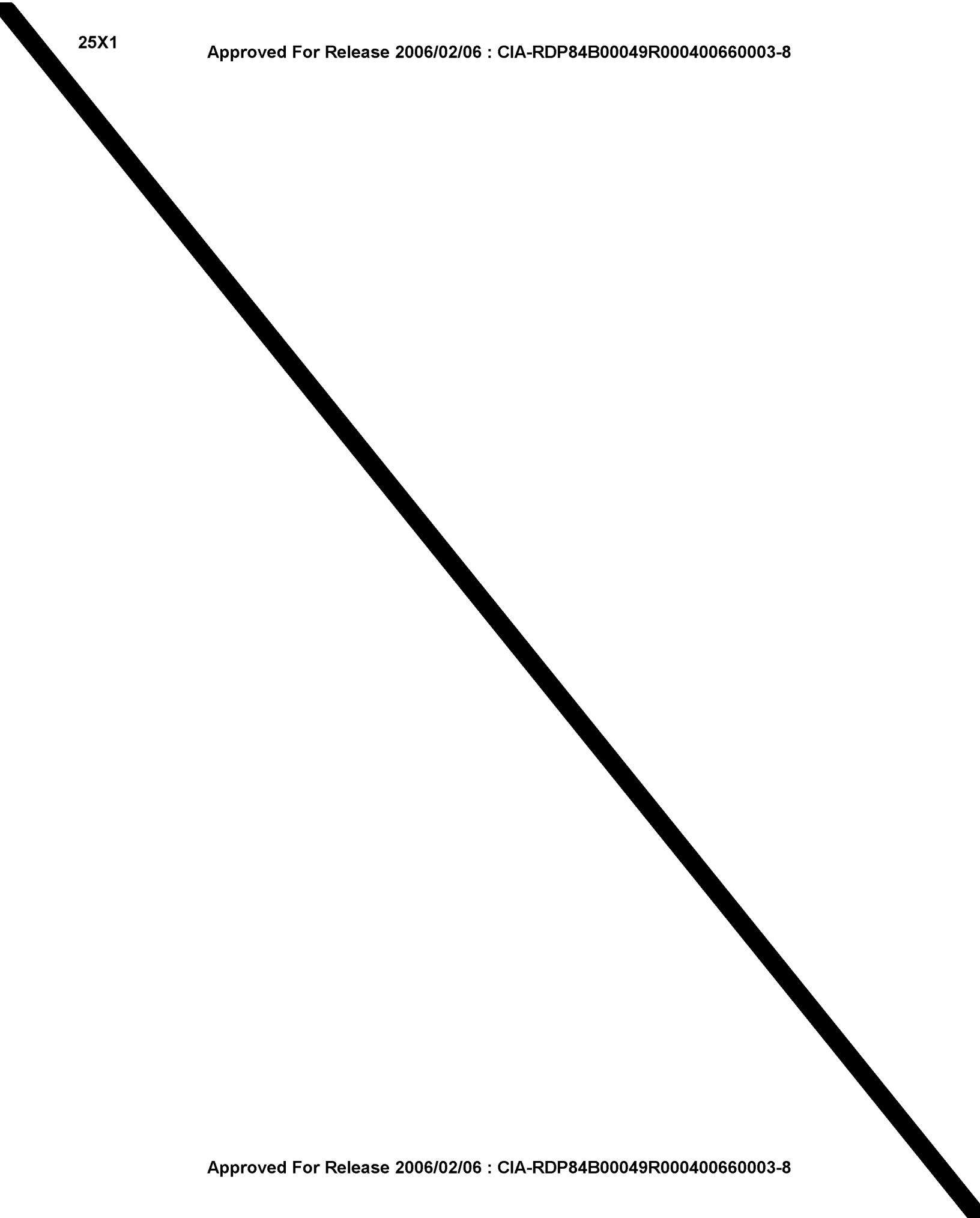

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Soviet Views on Energy Consumption in 1985 [redacted]

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A Research Paper

This paper was prepared by [redacted] the Office of Soviet Analysis. Questions or comments are welcome and may be addressed to the Chief, Soviet Economy Division, Office of Soviet Analysis, [redacted]

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Soviet Views on Energy Consumption in 1985

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Preface

The uncertainties in the Soviet energy situation lie as much on the demand side as on the supply side. Soviet statistics and publications, however, contain even less information about developments in the use of energy than about energy production. To shed some light on the future growth of energy demand in the USSR, the Office of Soviet Analysis has undertaken a number of studies of past trends and plans for the future and of energy requirements at the industry level and in the economy as a whole. This research paper is the first of three that are intended as support for the current CIA reassessment of the USSR's energy position. It is designed to (a) assess Soviet statements and statistics related to domestic energy requirements and the basis for these projections and (b) judge the realism of these projections by assessing the underlying assumptions regarding changes in the ratio of energy use to national income and the future growth of national income. It is not a systematic analysis of Soviet energy requirements based on a close examination of the energy needs of the various sectors of the domestic economy.

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Contents

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Soviet Views on Energy Consumption in 1985

Overview

Information available as of 1 July 1982 was used in this report.

CIA projections of energy demand in the USSR based on Soviet statistics, statements, and plans yield average annual rates of growth ranging from 1.8 to 2.8 percent during 1981-85. Although these projections are well below the growth experienced in recent years, they still outpace the growth in energy production that we foresee. Very large improvements in the efficiency with which energy is used would be necessary to bring supply into balance with the demand that Soviet planners may be projecting.

The disparity between domestic energy production and domestic demand will be less than Soviet statistics imply because overall economic growth will be lower than the Soviets project. Even so, closing the prospective gap would require greater conservation than has been achieved in the past if net exports are to be maintained at the 1980 level. The primary challenge to the planners will be to manage the substitution of natural gas for oil and other fuels so that the large-scale production potential of Soviet gas reserves can be realized beyond the needs of the export market.

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Table 1
USSR: Total Energy Consumption

Million tons standard fuel [a]

	Production	Imports	Exports [b]	Stock Change [c] (*all fuels*)	Domestic Consumption
1960	749.3	10.7	59.8	4.7	695.5
1965	1,036.3	9.1	117.1	6.7	921.6
1970	1,304.9	14.1	168.2	2.8	1,148.0
1975	1,661.1	36.5	241.3	15.0	1,441.3
1976	1,743.8	34.3	276.0	−26.4	1,528.5
1977	1,827.6	33.6	301.1	2.5	1,557.6
1978	1,902.7	35.0	308.8	−5.9	1,634.8
1979	1,971.2	26.3	317.7	14.6	1,665.2
1980	2,029.8	16.8	324.7	−3.4	1,725.3
1981 [d]	2,068	16	327	NA	1,757

[a] One million tons standard or reference fuel *(uslovnoye toplivo)* is equivalent to 1 million tons of high-quality hard coal (with an energy content of 7,000 kilocalories per kilogram), or about 700,000 tons (5.1 million barrels) oil equivalent.
[b] Published total export data have been adjusted to put exports of electricity on the same basis as primary electricity production, that is, converted at the annual heat rate of thermal power plants in the Soviet Union.
[c] Negative number indicates withdrawals from stocks; positive number indicates additions to stocks.
[d] Estimated.

Sources: *Narodnoye khozyaystvo SSSR*, Moscow, Statistika (various years); *Vestnik statistiki*, No. 1, 1978, p. 7; *Energetika SSSR v 1976-1980 godakh*, Moscow, Energiya, 1977, p. 61; *Elektricheskiye stantsiy* (various issues).

Soviet Views on Energy Consumption in 1985

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Introduction

The Soviets do not announce an explicit plan target for total energy consumption. We have therefore developed projections of total energy use with the help of estimating procedures that Soviet planners have used in the past and by analysis of statements by Soviet officials on the role of energy in the 11th (1981-85) Five-Year Plan. These projections provide a basis for assessing the Soviet Union's ability to meet internal energy requirements and export commitments under likely conditions of slow growth in domestic energy production.

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This paper begins with a survey of trends in domestic consumption of energy in the USSR and then derives alternative estimates of energy consumption in 1985 using three different approaches. It then compares these demand projections with a preliminary CIA forecast of energy supplies. Finally, the paper considers how the apparent shortfall in supply might be affected by (a) a bias in Soviet projections that leads to understatement of future energy demand and (b) the overstatement in projected energy demand implied by the 1981-85 Plan for Soviet economic growth.

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Energy Consumption Trends

During the 1960s, energy consumption in the Soviet Union rose at an average annual rate of 5.1 percent (see table 1). Growth in total energy use slowed from 4.7 percent in the first half of the 1970s to 3.7 percent annually in the latter half. Preliminary data for 1981 indicate that energy use rose by about 1.8 percent. The slow growth in 1981 was probably due to the smallest increase in total energy production since World War II and the need to maintain exports in the face of the deteriorating hard currency positions of both the USSR and Eastern Europe. Although economic growth was also low (GNP increased by only 1.8 percent), we believe that the numerous reports of energy shortages and energy rationing support the view that consumption was held back more by supply constraints than by a lagging economy.

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The shares of different fuels in total Soviet energy consumption have also shifted substantially over the past two decades. In the 1960s and 1970s the use of oil and natural gas increased more rapidly than total energy use (see table 2). Natural gas provided less than 8 percent of Soviet energy requirements in 1960 but 26 percent in 1980 (see table 3). During the same period, oil's share rose from 24 percent to 37 percent. The growth in oil and gas occurred at the expense of coal. In 1960 the Soviets relied on coal for more than half of their energy needs; today it provides only 27 percent.

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Estimating Demand as the Soviets Do

Although the USSR has not published a target for energy consumption in 1985, a range of projections can be developed. These projections are based on an analysis of the relationship between energy use and national income,

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and official goals for energy conservation.

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Projections Based on Energy–National Income Relation. The first demand projection is a simple analysis of the traditional link between energy demand and economic activity. An examination of the energy intensity of the Soviet economy *(as the Soviets measure it)* shows a downward trend in energy consumed per ruble of national income (see table 4). The projection methodology assumes a continuation of this trend and achievement of the national income growth targets of the 1981-85 Five-Year Plan—an average increase of 3.3 percent per year. If the decline in energy intensity continues at the 1976-80 rate of 0.8 percent per year, total energy demand in 1985 would be 1,951 million tons standard fuel, an average annual increase of 2.5 percent from 1980.[1] The annual rate of decline in energy intensity varies, however, depending

[1] One million tons standard or reference fuel *(uslovnoye toplivo)* is equivalent to 1 million tons of high-quality hard coal (with an energy content of 7,000 kilocalories per kilogram), or about 700,000 tons (5.1 million barrels) oil equivalent.

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Table 2
USSR: Energy Consumption by Fuel

Million tons standard fuel

	1960	1965	1970	1975	1980
Total	**695.5**	**921.6**	**1,148.0**	**1,441.3**	**1,725.3**
Production	749.3	1,036.3	1,304.9	1,661.1	2,029.8
Imports	10.7	9.1	14.1	36.5	16.8
Exports	59.8	117.1	168.2	241.3	324.7
Stock change	4.7	6.7	2.8	15.0	−3.4
Oil [a]	**168.7**	**254.7**	**369.2**	**520.0**	**644.4**
Production	211.4	346.4	502.5	701.9	862.6
Imports	6.3	2.7	3.3	10.9	9.9 [b]
Exports	47.4	91.8	136.4	186.5	236.0 [b]
Stock change [b]	1.6	2.6	0.2	6.3	−7.9
Natural Gas	**53.8**	**148.4**	**232.1**	**329.1**	**448.9**
Production	54.4	149.8	233.5	342.9	515.7
Imports	0	0	4.6	15.7	3.6
Exports	0.2	0.5	3.9	22.9	69.3
Stock change	0.4	0.9	2.1	6.6	1.1
Coal	**362.6**	**391.5**	**412.4**	**451.5**	**471.4**
Production	373.1	412.5	432.7	471.8	484.4
Imports	4.4	6.4	6.2	9.9	3.3
Exports	12.2	24.2	26.0	28.1	12.9 [b]
Stock change [b]	2.7	3.2	0.5	2.1	3.4
Other	**110.4**	**127.0**	**134.3**	**140.7**	**160.6**
Production:	110.4	127.6	136.2	144.5	167.1
Hydro [c]	23.8	33.8	45.7	42.8	60.3
Nuclear [c]	NEGL	0.6	1.3	6.9	23.9
Peat	20.4	17.0	17.7	18.5	7.3
Oil shale	4.8	7.4	8.8	10.8	11.9
Fuelwood	28.7	33.5	26.6	25.4	23.8
Other [d]	32.7	35.3	36.1	40.1	39.9
Exports:					
Electricity [c]	0	0.6	1.9	3.8	6.5

[a] Including gas condensate.
[b] Estimated.
[c] Converted at the average annual heat rate of thermal power plants in the USSR.
[d] Other types of renewable energy (geothermal, solar, and so forth).

Sources: *Narodnoye khozyaystvo SSSR*, Moscow, Statistika (various years); *Vneshnyaya torgovlya*, Moscow, Vneshtorgizdat (various years); *Annual Bulletin of Gas Statistics for Europe*, New York, United Nations (various years).

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Table 3
USSR: Fuel Shares in Energy Consumption

Percent

	1960	1965	1970	1975	1980
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Oil [a]	24.3	27.6	32.2	36.1	37.4
Natural gas	7.7	16.1	20.2	22.8	26.0
Coal	52.1	42.5	35.9	31.3	27.3
Other [b]	15.9	13.8	11.7	9.8	9.3

[a] Including gas condensate.
[b] Including hydro and nuclear electricity, oil shale, peat, fuelwood, other renewable energy sources (geothermal, solar, and so forth), and exports of electricity.

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on the historical period selected. The average for 1971-80 is 0.5 percent, whereas the rate for 1966-80 is 1.5 percent per year. Projections on the basis of 1981-85 goals for national income growth and these alternative trends in energy intensity (as might be measured by the Soviets) result in estimates of energy demand of 1,980 million and 1,883 million tons standard fuel, respectively (see table 5). They imply average growth in energy demand during 1981-85 ranging from 1.8 to 2.8 percent per year. [redacted]

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The second projection of energy demand relies on a statement by Nikolay Lopatin, a Deputy Minister of Power and Electrification, [redacted]

X1 X1 [redacted] in November 1981. He claimed that the Soviet economy was already energy efficient, citing an income elasticity of energy demand (the percent change in energy demand divided by the percent change in economic activity) of 0.87 and stating that this elasticity was expected to fall to 0.70 by 1985.[2] Using plan data for national income growth, energy demand in 1985 can then be projected on the basis of the indicated improvement in the income elasticity of energy demand with respect to national income. The resulting projection of 1,953 million tons standard fuel implies an average annual growth rate of 2.5 percent in 1981-85 and is nearly identical to the first projection (see table 5). [redacted]

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[2] With Soviet data, it can be determined that the 0.87 figure applies to the year 1980—3.4-percent growth in energy consumption (using unadjusted Soviet consumption data) divided by 3.9-percent growth in gross social product (the broadest aggregate Soviet indicator of economic activity). This measure of energy efficiency, however, is notoriously unstable from year to year because of changes in the composition of both energy use and economic activity. Lopatin could easily have demonstrated greater "energy efficiency" [redacted] by citing the 1976-80 average elasticity of 0.80 or even the 1979 figure of 0.49. [redacted]

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Table 4
Energy Intensity of the Soviet Economy, by Soviet Measure

	Total Energy Consumption *(million tons standard fuel)*	National Income [a] *(billion rubles)*	Energy Intensity *(kilograms standard fuel per ruble of national income)*
1960	695.5	142.8	4.87
1965	921.6	190.5	4.84
1970	1,148.0	285.5	4.02
1975	1,441.3	363.0	3.97
1976	1,528.5	383.0	3.99
1977	1,557.6	399.4	3.90
1978	1,634.8	420.6	3.89
1979	1,665.2	432.9	3.85
1980	1,725.3	450.8	3.83
1981 [b]	1,757	465.2	3.78

[a] Utilized for consumption and accumulation.
[b] Estimated.

Source: *Narodnoye khozyaystvo SSSR*, Moscow, Statistika (various years).

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The third projection of energy use in 1985 uses a statement in an early 1981 article by two officials of the USSR Academy of Sciences, A. A. Makarov and L. A. Melent'yev.[3] In discussing the relationship between *final* energy consumption (energy actually used by consuming sectors of the economy after the deduction of conversion and distribution losses and

[3] *Ekonomika i organizatsiya promyshlennogo proizvodsta*, No. 3, 1981, p. 27. [redacted]

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nonenergy uses) and national income, the authors indicate that, during the first 10 years of carrying out a great number of small and dispersed energy-saving measures, "it will obviously be possible to reduce the specific consumption of final energy by *not more* (emphasis added) than 5 to 7 percent. . . ." X1

Soviet energy balances indicate that final energy consumption as a share of total energy use was relatively constant during the 1970s.[4] Thus, the Makarov-Melent'yev statement can be assumed to apply also to total energy consumption. If it is further assumed that the 10-year period of energy savings begins in 1981 and that a gradual course of efficiency improvement is followed, the reduction in specific energy consumption by 1985 would be 2.5 to 3.6 percent. The resulting projections for total energy demand in 1985 are 1,958 million and 1,980 million tons standard fuel—again using Soviet targets for national income growth (see table 5). For 1981-85, these figures imply average annual growth in total energy demand of 2.6 to 2.8 percent, slightly higher than the first two projections. X1

ECE Balances. In addition to the projections described above, the energy balances submitted to the United Nations Economic Commission for Europe (ECE) by the Soviets provide yet another indicator of energy consumption growth to 1985. These balances, however, were prepared prior to the adoption of the 11th Five-Year Plan and before final 1980 production and consumption data were available. The total energy consumption estimate for 1985 provided to the ECE is 2,020 million to 2,080 million tons standard fuel. A comparison of this estimate with the 1980 balance submitted by the Soviets implies an average growth rate of 2.8 to 3.4 percent per year, somewhat higher than the reconstructed projections presented here (see table 5). A plausible explanation of this difference is that the Soviets, like others in international forums such as the ECE and the International Energy Agency, provided overly optimistic projections of energy availability and economic growth. X1

[4] Although the Soviet Union does not publish detailed statistics on final energy consumption, it provided a set of detailed energy balances in 1980 to the United Nations Economic Commission for Europe (ECE) as part of an international project to study energy problems and cooperation. X1

Projections Based on Conservation Goals. The final projections, developed to illustrate possible Soviet assessment of energy demand in the 11th Five-Year Plan, employ Soviet goals for saving fuels and energy. In its November 1981 revision of the plan, the Supreme Soviet set a target for "saving" more than 200 million tons standard fuel, or about 11 percent of current total energy use.[5] The new goal represents a substantial increase from the 160 to 170 million tons envisioned in the original version of the plan and suggests a heightened concern with energy efficiency. Actual savings during the last five-year plan were reported as 125 million tons standard fuel, although the plan called for 160 million tons.[6] 25X1

The Soviets use a somewhat peculiar method of measuring energy savings. The conservation targets include the incremental contribution of electricity generated from hydro and nuclear sources (not treated as conservation or savings in the West), and the calculation does not involve an accumulation of savings achieved in each year of the plan period.[7] In the Soviet view, if the savings target is to be achieved, total energy consumption in 1985 (the last year of the plan) would be 200 million tons less than that which would have obtained if the efficiency standards of 1980 had prevailed. 25X1

So far, the Soviets have not provided a detailed breakdown of their new conservation target consistent with that published for the 10th Five-Year Plan (1976-80). A comparison of the specific goals of the previous plan with those announced so far for the 1981-85 plan is presented in table 6. The added generation of electricity from hydro and nuclear sources has been shown separately to indicate "real" improvements in energy-use efficiency. 25X1

Our last projection assumes that, in the absence of conservation, the same energy use per unit of national income observed in 1980 (3.83 kilograms standard fuel per ruble) would prevail in 1985. Using an

[5] *Pravda*, 18 November 1981, p. 2. 25X1
[6] *Ibid.; Izvestiya*, 15 May 1981, p. 2; *Ekonomika i organizatsiya promyshlennogo proizvodstva*, No. 9, 1980, p. 124. 25X1
[7] *Planovoye khozyaystvo*, No. 1, 1981, p. 35. 25X1

Table 5
USSR: Alternative Projections of 1985 Total Energy Demand

Methodology [a]	Total Energy Demand *(million tons standard fuel)*	Average Annual Growth (1981-85) *(percent)*	Implied Savings *(million tons standard fuel)* [b]
1. Continuation of decline in energy use per unit of national income:			
—0.8 percent per year (1976-80 average)	1,951	2.5	80
—0.5 percent per year (1971-80 average)	1,980	2.8	51
—1.5 percent per year (1966-80 average)	1,883	1.8	148
2. Decline in energy/economic activity elasticity from 0.87 in 1980 to 0.70 in 1985 (Lopatin, November 1981)	1,953	2.5	36
3. Ten-year decline in final energy use per unit of national income of 5 to 7 percent (Makarov and Melent'yev, March 1981):			
—2.5 percent by 1985	1,980	2.8	51
—3.6 percent by 1985	1,958	2.6	73
4. ECE submission (mid-1980)	2,020-2,080	2.8-3.4	NA
5. Meeting planned conservation target [c]	1,885	1.8	146
6. Reduced conservation in line with 1976-80 results (74 percent achieved) [c]	1,923	2.2	108

[a] With the exception of projection 4, all the projections assume that national income grows at the planned rates in 1982-85.
[b] Implied savings or "conservation" are calculated as the difference between the respective projections and the 1985 demand level without improvements in energy use per unit of national income (for projections 1 and 3) or improvements in the elasticity of energy demand with respect to economic activity (projection 2).
[c] After deduction of the planned or actual contribution of increased hydro and nuclear electricity production, which the Soviets consider to be energy savings.

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adjusted target of 17.6 percent of national income growth in 1981-85, total energy demand would rise to 2,031 million tons standard fuel in the last year of the current plan.[8] If the savings goal of 146 million tons (excluding the increments from hydro and nuclear electricity) is achieved, energy demand in 1985 would be reduced to 1,885 million tons.[9] This is one of the lowest projections and yields an energy demand growth rate of only 1.8 percent per year. [redacted] 25X1

The conservation goals, however, are probably too ambitious. To test the effect of not achieving these goals, we assumed that conservation in 1981-85 would be only as successful as it was in 1976-81. Adjusting the actual savings of 125 million tons standard fuel in 1976-80 and the planned savings of 160 million tons to eliminate the share from increased hydro and nuclear electricity (36 million tons versus the 39 million tons planned) yields a "real" saving of only 89 million tons standard fuel, 74 percent of called-for conservation. Using 74 percent as the ratio of

[8] The 1981-85 plan called for 17.8-percent growth over the period in national income. In 1981, however, growth was 3.2 percent instead of the planned 3.4 percent. [redacted]
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[9] Conservation savings may also be calculated for the first three projections by comparing the projected values for 1985 energy demand with the energy demand that would be implied by planned national income growth coupled with the efficiency standards of 1980. The savings range from a low of 36 million tons standard fuel in the case of the elasticity improvement scenario to a high of 148 million tons—greater than the planned level—if the 1966-80 average annual decline of 1.5 percent in the energy intensity measure is used. [redacted]
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Table 6
Soviet Planned Energy Savings

Million tons standard fuel

Item	1980 *(compared with 1975)*	1985 *(compared with 1980)*
Reduction of specific fuel consumption in the production of manufactured products	44	NA
Reduction of specific consumption in the production of electricity and thermal energy	36	76
Better use of secondary fuels and heat resources	19	
Reduction of specific consumption of light petroleum products and improvement in the structure of truck transport	15	15
Reduction of fuel losses during storage and transport	7	NA
Reduction of boiler fuel use in direct combustion	... [a]	55
Subtotal	**121**	**146**
Increase in electricity production from hydro and nuclear power plants	39 [b]	62 [c]
Total	**160**	**208**

[a] Not counted as a savings item in the 1976-80 plan.
[b] Actual "savings" were 36 million tons standard fuel.
[c] Calculated from 1985 targets for hydro and nuclear electricity production.

Sources: *Ekonomika i organizatsiya promyshlennogo proizvodstva,* No. 9, 1980, p. 124; *Izvestiya,* 15 November 1981, p. 2.

achieved conservation to planned conservation, total energy demand in 1985 would be 1,923 million tons standard fuel, an average annual increase during the plan period of 2.2 percent per year.[10] 25X1

Makarov and Melent'yev in fact acknowledge that progress in conservation has been slow in recent years. They explain that the potential for energy savings in several areas—improving the efficiency of rail transportation, reducing specific consumption of fuels in the generation of electricity, and substituting natural gas and oil for solid fuels, for example—is being exhausted.[11] In the current Five-Year Plan, the Soviets expect to concentrate on increased centralization of heat supply, replacement of energy-inefficient equipment, dieselization of the motor vehicle fleet, and wider usage of secondary energy resources. They will have a difficult time, however, meeting their ambitious savings target because so much of the savings involve large investments during a period when there is fierce competition for investment resources. 25X1

Implications of the Demand Projections

If Soviet planners are indeed counting on energy consumption to grow by roughly 2 to 3 percent per year during 1981-85, they might well have to make some major adjustments before long to 1981-85 plans for the allocation of energy supplies. Growth in energy production is likely to fall short of the growth in energy consumption implied by projections based on

[10] This methodology can be applied to the 1976-80 period to compare the results with actual energy consumption in 1980. In 1975, energy use per ruble of national income was 3.97 kilograms standard fuel. National income grew to 450.8 billion rubles in 1980, implying—again in the absence of any improvement in the energy efficiency of the Soviet economy—total energy consumption of 1,790 million tons standard fuel. When the "actual" conservation of 89 million tons is subtracted, the resulting figure of 1,701 million tons is close to the actual level of energy use in 1980 (1,725 million tons standard fuel by our measurement). This calculation demonstrates that the decline in energy intensity of the Soviet economy observed during 1976-80 (using the Soviet measure of economic growth) is roughly consistent with the Soviet measure of "conservation," when the growth of hydro and nuclear electricity production is excluded. 25X1

[11] *Ekonomika i organizatsiya promyshlennogo proizvodstva,* No. 3, 1981, p. 30. 25X1

Soviet procedures. Equally important, the Soviet forecasting procedures have a pronounced bias that results in an underestimate of future energy consumption. To match consumption and supplies in the context of the 1981-85 plan, Moscow would have to trim domestic allocations or net exports. Substantially slower economic growth—and therefore slower growth in energy demand—seems to be the only development that could close the prospective gap between energy supplies and the demand for energy. [redacted]

Comparison of Supply and Demand Projections. The projections of growth of domestic energy consumption in table 5 mainly fall in the 2.5- to 3-percent range, with a few around 2 percent per year. But even in the lowest projection, total energy demand rises to 1,883 million tons standard fuel in 1985. Since we estimate that total energy production probably will rise to only 2,193 million tons (compared with the 2,335 million tons planned—see table 7), net energy exports would have to decline marginally from the 308 million tons registered in 1980 to support domestic consumption at the projected level. Two of the other projections, however, suggest energy consumption of 1,980 million tons in 1985 and, coupled with our assumption regarding energy production, imply a reduction in net exports between 1980 and 1985 of about one-third (from 308 million tons to 213 million tons).[12] [redacted]

The Bias in Soviet Procedures. The shortfalls indicated above only take into account the effect of a failure of energy supplies to measure up to plan. Were the Soviets to use the methodologies described above to project energy requirements in the 1980s, they would be systematically understating future energy use if the national income plan is met. Because of embodied inflation and double counting in economic statistics, reported growth in national income is higher than planned growth even if every quantitative goal is met precisely.[13] Therefore, with economic activity inflated by Soviet measure, energy consumption per unit of "actual" national income will be higher than the ratio the Soviets calculate simply because the denominator in the calculation is smaller. [redacted]

In addition, estimates of past increases in energy efficiency will be exaggerated. In fact, by Western measures of economic activity, the trend in the energy intensity of the Soviet economy as measured by an energy/GNP ratio has actually been upward since 1977, not downward as the energy/national income statistics in table 4 suggest (see figure). The ratio of energy consumption to GNP was 1.046 in 1977 (1970 = 100). It has increased each year since and in 1980 stood at 1.099. Preliminary data for 1981 yield a ratio of 1.098. [redacted]

The importance of the likely Soviet miscalculation of energy efficiency can be shown by using the energy consumption/GNP ratio and the 1981-85 plan goals to estimate the energy consumption necessary to meet

Table 7
USSR: Total Energy Supply in 1985

Million tons standard fuel

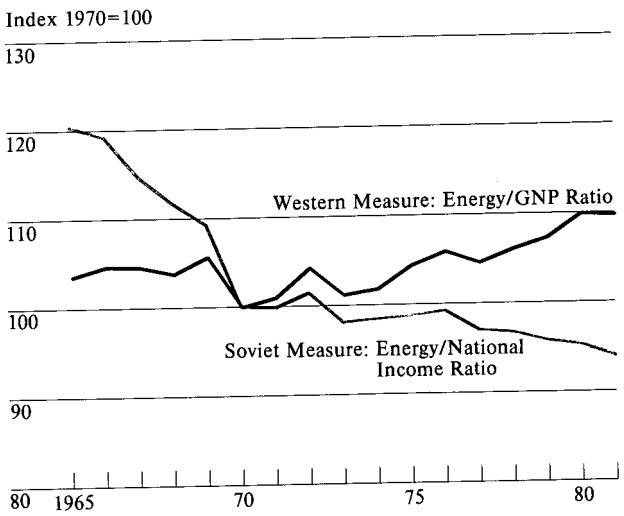
	Plan	Preliminary Estimate
Total	**2,335**	**2,193**
Oil [a]	901	822 [b]
Natural gas	747	693
Coal	473	480
Hydro [c]	74	72
Nuclear [c]	70	56
Other [d]	70	70

[a] Including gas condensate.
[b] The outlook for Soviet oil production is currently being restudied. The amount shown, therefore, is a *provisional* level of annual output (equivalent to 11.5 million b/d) and is subject to change.
[c] Converted at the planned or estimated average heat rate of thermal power plants in the USSR.
[d] Including peat, oil shale, fuelwood, and other types of renewable energy sources (geothermal, solar, and so forth). The Soviet Union does not publish a plan for these categories of energy production. The figure shown is that provided by the Soviets to the United Nations Economic Commission for Europe in 1980.

[redacted]

[12] Soviet plans for energy production are at least consistent with our reconstructed demand projections. If the Soviets were to meet their energy output targets, available energy exports would exceed the 1980 level in 1985 regardless of the demand projection selected. (U)
[13] For a discussion of this issue, see NFAC Research Paper ER 80-10461 (Unclassified), August 1980, *Comparing Planned and Actual Growth of Industrial Output in Centrally Planned Economies.* [redacted]

Comparison of Soviet and Western Measures of Energy Efficiency



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the plan goals in 1985. The 1981-85 plan implies a 4.3-percent-per-year increase in Soviet GNP by Western measure. If the USSR succeeds in arresting the rise in the energy consumption/GNP ratio and holds it to the 1980 level, energy consumption, rising at the same rate as planned GNP, would reach 2,130 million tons standard fuel in 1985. This alternative projection of energy demand is 150 to 247 million tons (and 8 to 13 percent) higher than the projections based on Soviet energy intensity measures that are summarized in table 5.

Saved by Slower Growth? Soviet energy planners, we have suggested, may well be overly optimistic in projecting the trends in both energy production and energy demand in the 1981-85 period. If the 1981-85 plan were on schedule, the shortfalls in energy supplies would be having more of an impact on domestic allocations and exports than has been reported so far. Soviet economic performance, however, is falling far below plan. Our most recent baseline estimates indicate that average annual growth in GNP will do well to reach one-half of the rate implied by the Five-Year Plan.[14] Analogously, Soviet national income growth would be 2 percent per year instead of the 3.3 percent per year in the plan.

Two-percent annual growth in national income (by Soviet measure), coupled with some increase in the efficiency with which energy is used, could close the implied gap between projected demand and supply outlined above. With no improvement in efficiency, domestic consumption of energy would rise to 1,905 million tons standard fuel in 1985—288 million tons less than the production we project. To maintain net energy exports at the 1980 level would then require only 20 million tons of energy savings.[15] Savings on this scale seem much more plausible than the savings implied by the demand projections in table 5. Whereas those projections required reductions in energy use per ruble of national income during 1981-85 ranging from 2.5 to 7.2 percent, a decline of only 1 percent would permit savings of 20 million tons standard fuel. Even this relatively small amount of energy savings will not be easy to achieve as evidenced by the performance of the energy/GNP ratio in the 1970s. But it should be possible. During most of the 1970s, there was abundant energy available and little real incentive for conservation. Moreover, the Soviets have demonstrated—in 1968, 1970, 1973, 1977, and 1981—that the energy efficiency of the economy can be improved.

If the USSR can manage such energy savings, the challenge to the Soviet Union would then be to manage the consumption of particular kinds of energy so as to realize export possibilities. Since natural gas

[14] DDI Research Paper SOV 82-10127 September 1982, *USSR: Economic Projections, 1982-90*, p. 3.

[15] Energy savings are here defined as the difference in 1985 between energy demand without any improvement in energy use per unit of national income during 1981-85 and demand assuming some decline in energy intensity per unit of national income.

will account for such a large part of the increment in energy production between 1980 and 1985, natural gas will have to be substituted extensively for oil and other fuels in domestic use. Otherwise, the USSR runs the danger of having gas production constrained by its inability to use at home the difference between the volume of gas it could produce and the volume of gas it is able to sell abroad, a volume already fixed within narrow limits by contracts and pipeline capacity [redacted]

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Next 3 Page(s) In Document Exempt

Approved For Release 2006/02/06 : CIA-RDP84B00049R000400660003-8